Subsurface Mapping

The helicopter pictured at right, operated by AirBorne Pipeline Services, Inc., Redmond, Washington, is an aerial mapping platform whose on board equipment can "see" underground to aid more economical pipeline construction and monitoring. Boom-mounted sensors provide input for electromagnetic sounding systems that produce computer-processed views of subsurface features.

The company's Geologic Sounder is a fast, cost effective method of obtaining accurate geologic surveys down to 650 feet below ground. It has been used in the U.S. and Canada for locating and mapping coal seam depths, mineral bearing deposits and boulder/bedrock formations in placer gold fields.

A companion Geotechnic Sounder, accurate to 82 feet, is a tool for pipeline preconstruction surveys; for example, if the subsurface map shows bedrock or ice, planners can alter the path of the pipeline, avoiding expensive surprises during construction. Capable of covering 250 miles a day, the system offers quick, inexpensive data collection for use in establishing target areas for sinking boreholes or for interpolating between boreholes. It is also used for mapping—even through concrete or asphalt—existing underground pipelines, telephone cables and power lines. The lower illustration shows a computer-created image based on Geotechnic Sounder data. The pipe is red-orange, the pipe coating yellow; other features shown are silts (dark blue) and sands (light blue); the orange stack above ground is an air duct. The system has additional application in mapping subsurface conditions of interest to environmental engineers, such as polluted soils or aquifers containing heavy metals, acids or petroleum.

Other services offered by AirBorne Pipeline include monitoring oil and gas pipelines for early signs of leaks or corrosion, matters of prime concern to pipeline operators because of high pipe replacement costs, potential product loss and environmental considerations. The company's AirBorne Cathodic Protection Monitoring System, which studies the effectiveness of corrosion-prevention measures, and the Hydrocarbon Detection System, used for leak detection, offer less expensive and far more rapid alternatives to traditional pipeline inspection by walking ground crews.

The helicopter-based systems incorporate NASA technology in several areas. Ames Research Center, active in research on sensors for Earth resources observation programs, provided technology used in development of the sounding instruments and guidance for mounting the instruments on composite helicopter booms. Quality control measures were based on Johnson Space Center quality control manuals developed for NASA's Apollo and Space Shuttle programs. Ames, Johnson, and Goddard Space Flight Center all assisted with technical advice on mission planning and program management. All of AirBorne Pipeline's systems were first developed by Applied Science, Inc., a subsidiary of Northwest Energy Company, Salt Lake City, Utah, under the direction of Dr. Michael E. Stamm, then vice president of Applied Science. That company was acquired by AirBorne Pipeline last year and Dr. Stamm became president of the latter firm.